Lightweight Rubbery Aerogel Composites for High Performance Protection, Phase I

Completed Technology Project (2007 - 2008)

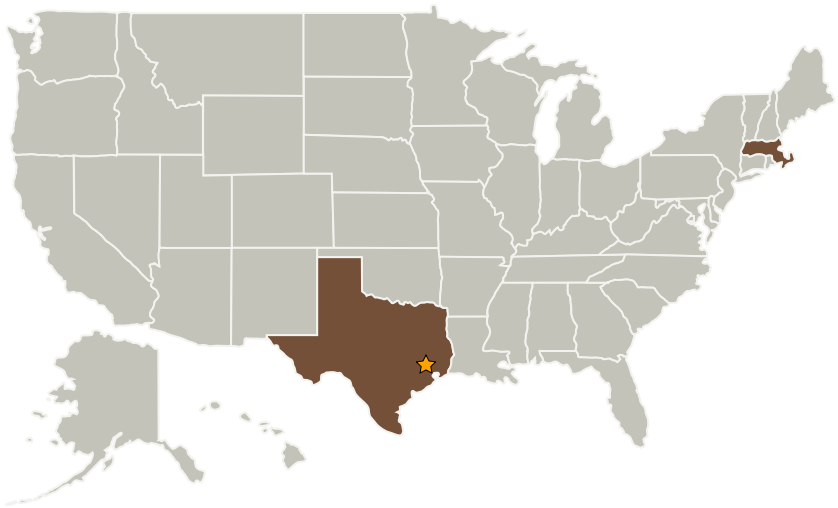
Project Introduction

Aspen Aerogels Inc. (AAI) and the Man Vehicle Laboratory (MVL) at the Massachusetts Institute of Technology propose to develop nanostructured, lightweight, rubbery aerogel composites for multifunctional insulation materials which will significantly improve advanced extravehicular activity (EVA) systems and habitats. The proposed rubbery aerogel composite materials will exhibit excellent flexibility, toughness and durability, versatility, and hardness, along with the low density and superior thermal insulation properties associated with the nanopored structure of aerogels. The flexible rubbery behavior of the proposed materials will overcome the weak, brittle, and dusty nature of conventional inorganic and organic aerogels. The proposed high-performance, lightweight, rubbery aerogel composites will provide superior thermal insulation and inherent radiation protection suitable for NASA advanced extravehicular activity (EVA) suits and exploration habitat protection. Insulating aerogel composites are also applicable to NASA's space hardware and vehicles as well as many other aerospace, military, and commercial insulation applications.

Anticipated Benefits

Potential NASA Commercial Applications: Other potential applications include use as insulation in commercial and military aircraft, cryogenic tanks, liquefied gas transport, gloves, footwear, systems for warming, storing, and/or transporting food and medicine, sleeping bags and pads, military and recreational tents, etc. The new rubbery aerogels can be recycled for use as impact modifiers and/or filler materials for conventional plastics.

Primary U.S. Work Locations and Key Partners



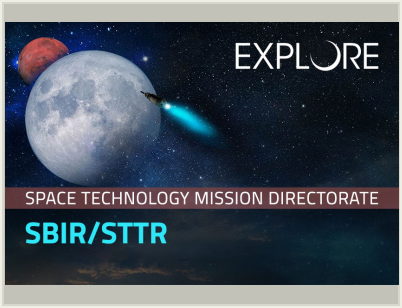


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Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Aspen Aerogels, Inc.	Supporting Organization	Industry	Northborough, Massachusetts
Human Systems Laboratory at the Massachusetts Institute of Technology(HSL)	Supporting Organization	Academia	Cambridge, Massachusetts

Primary U.S. Work Locations	
Massachusetts	Texas

Project Transitions

January 2007: Project Start

January 2008: Closed out

Closeout Summary: Lightweight Rubbery Aerogel Composites for High Perform ance Protection, Phase I Project Image

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Jekyun Lee

Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.3 Thermal Protection Components and Systems
    - TX14.3.1 Thermal Protection Materials